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the paths of FIG. 5) and that each acoustic image is examined alternately and processed as shown in FIG. 9. The combined paths constitute further acoustic images (fifth, sixth . . . Nth acoustic images) which can be processed by the microprocessor 45 in the same manner. As noted in FIG. 5, the acoustic path to the target T will provide resolution of the aspect problem since any acoustic reflection which renders the target essentially "transparent" to one transducer (such as a sheet of plywood which will cause all reflections to be diverted from the transducer), cannot have the same effect on the other transducer.

As an example, microprocessor 45 will cause the following sequence of transmit and receive operation of the transducers 1, 2 and 3:

	Transmit	Receive
DOOR IS CLOSED		
Long Range	1	1
	2	1
	2	2
	1	2
Short Range	3	3
	1	3
	3	3
	2	3
DOOR IS OPENED		
Long Range	2	2
	2	3
Short Range	3	3
	3	2
DOOR IS CLOSING		
Long Range	1	1 (repetitive)

While acoustic transducers are disclosed as being the preferred embodiment, especially for the swingside safety system, a mix of transducers can be used. For example, a mat or microwave or infrared sensor can be used on the approach side with ultrasonic acoustic transducers on the swingside, each being scanned or operatively examined in a predetermined sequence by microprocessor 45.

Microprocessor 45 may have programmable read-only memories (PROM) for storing the program and the sequence of transducer operation and multiplexer 80 channel selection on line 81. The random access memories (RAM) of microprocessors store the characteristic numbers of each acoustic image for use in the comparison, which is done by the microprocessor. The programming of the microprocessor is conventional and routine.

In this embodiment, microprocessor 45 has a "learn switch" 45LS connected thereto so that the system can be operated in a learn mode. The microprocessor periodically checks the position of learn switch 45LS and upon operation thereof, after installation of the system, a sequence of door openings and closings are initiated on door control bus 1. The digital acoustic image of the various transducers 1, 2 and 3 in the sequences illustrated above, are developed and, along with the position of learn switch 45LS, stored in a non-volatile memory 45NVM which may be a NOVRAM type device or an E²PROM type device. After a predetermined number of door opening and closing cycles constituting the learn period, switch 45LS is returned to a position for normal operation in the manner discussed above.

While there has been shown and described the preferred embodiment of the invention, it will be appreciated that this disclosure is for the purpose of illustration and various changes and substitutions of equivalent

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elements may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed:

1. In an automatic door opener for swinging doors having a door operator and sensor means for detecting a person for whom the door is to be opened, for producing a door opening signal and means coupling said door opening signal to said door operator to open said swinging door, the improvement comprising,

at least three ultrasonic beams transducer means for projecting at least three ultrasonic beams at three different angular orientations, respectively in a common selected detection zone in the path of said swinging door, at least one of said directions being centrally located on the swingside of said swinging door, and means for converting reflected ultrasonic beam energy to digital electrical signals constituting a first plurality of acoustical images of objects in said common selected detection zone including acoustic images caused by intratransducer reflections,

means for storing said first plurality of acoustical images,

means for comparing each said stored acoustical image in said selected detection zone with a later and corresponding plurality of acoustical images of objects in said selected detection zone, and

means for indicating the lack of correlation between said plurality of stored acoustical images and said later plurality of acoustical images, respectively, and producing signals preventing operation of said door opening signal.

2. The invention defined in claim 1 wherein said means for storing includes a non-volatile digital memory.

3. The invention defined in claim 1 including means for converting each said first plurality of acoustical images to first characteristic numbers therefor, respectively, and each said second plurality of acoustical image to second characteristic numbers, respectively, each of said characteristic numbers corresponding to the acoustic image of said detection zone from the perspective of the ultrasonic beam transducer means producing the acoustic image, and means for comparing corresponding first and second characteristic numbers to detect a lack of correlation as an indication of the presence of an unwanted object in said selected detection zone.

4. In an automatic door opener, a method of monitoring the swingside of a swinging door to detect the presence of an object therein and prevent swing of said door into said object,

providing at least three ultrasonic transducers oriented at different angular directions at a common detection zone on the swingside of the door for projecting ultrasonic beams into said swingside of said swinging door, including at least one centrally projected beam, and receiving ultrasonic reflections from targets along each of said different angular directions, respectively to produce acoustic images including acoustic images caused by intratransducer reflections,

comparing the acoustic images from each said transducer with a stored acoustic image from the same respective transducer, and